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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

CREPEAU, JONATHAN

ART UNIT PAPER NUMBER

1746

DATE MAILED: 10/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/917,630

Applicant(s)

SUDA, SEIJIRAU

Examiner

Jonathan S. Crepeau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Suggestions

1. In claim 10, the phrase "anion exchange, exchange membrane" should probably be changed to "anion exchange membrane." Appropriate correction is suggested, but not required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 3-8 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al (U.S. Patent 5,599,640). Regarding claim 1, the reference is directed to an alkaline fuel cell comprising a negative electrode, a positive electrode, and an electrolyte solution (see abstract). Regarding claims 1 and 5, the electrolyte solution comprises KOH or NaOH at a pH greater than 7. Regarding claim 6, this range of pH is anticipatory of the claimed range of alkali metal hydroxide in solution (5-30 wt%) because solutions having a pH between 7 and 14 contain weight percentages of alkali metal hydroxide which encompass the claimed range. Regarding claims 1, 3, and 4, the electrolyte further comprises a metal-hydrogen complex capable of generating hydrogen ions, such as potassium borohydride, sodium borohydride or lithium aluminohydride (see abstract). Regarding claim 7, the amount of metal-hydrogen complex in the electrolyte solution is 0.01-50 wt% (see col. 4, line 13). Regarding claims 1 and 8, an oxygen

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source such as air or pure oxygen is connected to the cathode (see col. 5, line 57). Regarding claims 1 and 10, a separator (permeable membrane) functioning as an ion conductor is present between the electrodes (see col. 4, lines 45-48). Regarding claim 10, the disclosure of an "ion conductor" is considered to be anticipatory of a cation exchange membrane and an anion exchange membrane. Regarding claim 1, the negative electrode contains a hydrogen storage alloy (see col. 4, lines 34-44).

Thus, the instant claims are anticipated.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al.

The reference is applied to claims 1, 3-8 and 10 for the reasons stated above. Further, the reference teaches a $Zr_{1-x}Ti_xCr_{1-Y-Z-A-B}Mn_YFe_ZCo_AV_BNi$ hydrogen storage alloy in column 4, line 40. This formula reduces to $Zr_{0.6}Ti_{0.4}Cr_{0.5}Mn_{0.5}Ni$ when $X=0.4$, $Y=0.5$, $Z=0$, $A=0$, and $B=0$.

However, the reference does not expressly teach the same subscripts as recited in claim 2, i.e., a $Zr_{0.5}Ti_{0.5}Cr_{0.5}Mn_{0.5}Ni$ hydrogen storage alloy.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan may reasonably expect that a $Zr_{0.5}Ti_{0.5}Cr_{0.5}Mn_{0.5}Ni$ material and a $Zr_{0.6}Ti_{0.4}Cr_{0.5}Mn_{0.5}Ni$ material would have the same hydrogen-absorbing properties. A *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. See *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985); MPEP §2144.05(I).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. in view of Narayanan et al (U.S. Patent 6,485,851).

Lee et al. is applied to claims 1, 3-8 and 10 for the reasons stated above.

However, the reference does not expressly teach that the oxygen source is an aqueous solution of a water-soluble oxidizing compound, as recited in claim 9.

Narayanan et al. is directed to a liquid fuel cell. In Example 1, the reference teaches that the oxygen source is an aqueous solution of hydrogen peroxide.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of Narayanan et al. to use aqueous hydrogen peroxide as the oxygen source of Lee et al. In column 1, line 62, Narayanan et al. disclose the following:

However, there still exists a need for an organic fuel cell capable of using an alternative oxygen source. In some fuel cell applications, air is absent or available in only limited quantities. For example, submarines and other underwater applications have little to no oxygen available for fuel consumption. Low noise signature, high volume and high specific energy density are also desirable for such underwater applications. High energy fuel cells based on pure compressed hydrogen and oxygen gas are disadvantageous for several reasons. The compressed tanks present safety concerns. The compressed tanks are also heavy and take up a lot of space which are impracticable or undesirable for some applications. Such cells also present other environmental and safety problems.

Thus, the artisan would be sufficiently motivated by this disclosure to use aqueous hydrogen peroxide as the oxygen source of Lee et al.

7. Claims 11-14 rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. in view of Wang et al (*J. Alloys and Compounds*, 1999).

Lee et al. is applied to claims 1, 3-8 and 10 for the reasons stated above. Further, regarding claim 13, Lee et al. teach that the negative electrode contains PTFE, thereby rendering the catalyst layer "fluorinated."

However, the reference does not expressly teach that the negative electrode comprises a substrate plate and a 50-300 micron-thick cladding layer containing the hydrogen-absorbing alloy, as recited in claims 11 and 12.

The publication of Wang et al. is directed to an alkaline fuel cell employing a hydrogen absorbing alloy negative electrode. In Figure 2, the reference teaches that the negative electrode is comprised of a foamed nickel substrate, a catalyst (cladding) layer on the substrate, and a

waterproof layer on top of the cladding layer. Both the cladding layer and the waterproof layer contain PTFE (see page 834, first full paragraph). The cladding layer has a thickness of 250 microns and the waterproof layer has a thickness of 200 microns (see page 835, third full paragraph).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the negative electrode of Wang et al. in the fuel cell of Lee et al. In section 3.5, Wang et al. teach that it is important that the anode has a long lifetime (550 h). The artisan would therefore be motivated to use this anode in the fuel cell of Lee et al. in hopes of increasing the lifetime of the anode.

Regarding claim 13, which recites that the hydrogen absorbing alloy is fluorinated at least in the surface layer, the PTFE present in both the catalyst layer and the waterproof layer of Wang et al. would render this limitation obvious. With regard to the catalyst layer, the PTFE functions as a binder and would be present on the surface of the alloy particles. With regard to the waterproof layer, the PTFE is present as a surface coating over the entire face of the catalyst layer. Regarding claim 14, which recites that the thickness of the fluorinated surface layer is from 0.01 to 1 micron, the artisan would possess sufficient skill to manipulate the PTFE content/thickness in either the catalyst layer or the waterproofing layer so as to fall within the claimed range. The content of PTFE in the catalyst layer may be as low as 5 wt% (see section 3.1) and the content is recognized as a result-effective variable (see Fig. 3). The content would affect the thickness of the PTFE on the surface of the particles in the layer. Similarly, the thickness of the waterproofing layer is recognized as a result-effective variable (see Fig. 5). This

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thickness could also be manipulated by the artisan, the artisan being mindful that the alkaline fuel cell of Lee et al. is not concerned with waterproofing the anode and this layer could thus be substantially reduced in thickness or eliminated.

Conclusion

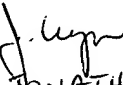
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (703) 308-4333. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 872-9310 (for non-final communications) or (703) 872-9311 (for after-final communications).

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JSC

October 3, 2003


JONATHAN CREPEAU
PATENT EXAMINER
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